What is chlorine?

Chlorine is a greenish-yellow gas or an amber liquid under high pressure or refrigeration. Chlorine gas has a pungent, irritating, suffocating odor. The odor threshold for chlorine in air has been reported to be 0.02-0.31 parts per million (ppm) for most individuals. It is slightly soluble in water and soluble in alkalis. Chlorine gas is 2½ times heavier than air.

Chlorine is used most frequently to manufacture other chemicals, such as inorganic chlorides and chlorinated organic compounds. These chlorinated chemicals are often used as solvents, anti-knock compounds, refrigerants, and pesticides. It is used in the production of plastics and resins. It is used by the pulp and paper industry for bleaching purposes. Chlorine is a powerful disinfectant and as such it is widely used in the chlorination of drinking water supplies, swimming pool water effluents, cooling system water, and sewage. Chlorine is also used in household bleaches, pharmaceuticals, and cosmetics, as well as in the beneficiating of ores and metal extraction.

Who is exposed to chlorine?

People may be exposed to chlorine through breathing, skin, or eye contact if an accidental chlorine spill takes place nearby. Chlorine gas is released if you mix household chemicals such as toilet cleaner or other cleaners containing ammonia with bleach. Improper use of swimming pool chemicals may also result in chlorine exposure.

How can chlorine affect my health?

Low levels of chlorine can cause irritation if it comes in contact with the eyes and skin, or if it is inhaled. Higher levels can damage the lung. Severe acute effects from short-term, high level exposure have been documented from exposures of soldiers during World War I when chlorine was used as a war gas. Deaths were reported from bronchopneumonia, lobar pneumonia, purulent pleurisy, and tubercular meningitis. Disabilities occurred from bronchitis, pleurisy, tachycardia, nephritis, and dyspnea.

How likely is chlorine to cause cancer?

To date, there is no evidence that chlorine causes mutations, cancer, or birth defects in humans.

How can chlorine affect children?

Chlorine exposure will have the same effect on children as on adults. It is not known whether they are more sensitive to the effects. It is not known whether chlorine exposure to pregnant women will result in damage to unborn babies.

Is there a medical test to determine whether I have been exposed to chlorine?

There are no medical tests to determine chlorine exposure.

How can I reduce the risk of exposure to chlorine?

You can reduce the risk of exposure by storing chemicals properly, away from the reach of young

children. Do not mix bleach with toilet cleaner, or other household cleaners that contain ammonia.

If you have a swimming pool, read the labels of the pool chemicals, use them appropriately, and store them carefully, away from children.

Has the federal government made recommendations to protect human health?

The National Institute for Occupational Safety and Health (NIOSH) has recommended that workers should not be exposed to 0.5 ppm or higher for more than 15 minutes. The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended a threshold limit value (TLV) for chlorine in workplace air of 0.5 ppm as an 8-hour time-weighted average. OSHA set a legal limit of 1 ppm chlorine in air as a ceiling limit. At no time should a worker's exposure exceed this limit. Ten ppm chlorine in air is considered by NIOSH to be immediately dangerous to life or health (IDLH). The IDLH is the concentration that could result in death or irreversible health effects, or could prevent the exposed individual from escaping the contaminated area in 30 minutes. The U.S. Environmental Protection Agency (EPA) established an environmental air limit of 0.5 ppm. EPA established a maximum contaminant level (MCL) and maximum residual disinfectant level (MRDL) of 4 milligrams per liter (mg/L) for free chlorine in drinking water.

Where can I get more information on chlorine?

- If you have concerns about chlorine, contact your healthcare provider.
- Call your local health department. A directory of local health departments is located at http://www.vdh.virginia.gov/local-health-districts/. Contact the Virginia Department of Health at (804) 864-8127 or at toxicology@vdh.virginia.gov.
- Visit the Agency for Toxic Substances and Disease Registry website at https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=36 .

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